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FUEL BREAK EFFICACY FOR BRITTLE 2 **FUELS REDUCTION PROJECT**

On The Huron-Manistee National Forests



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Reviewed by: /s/ Joe Alyea Date: 04/19/2010

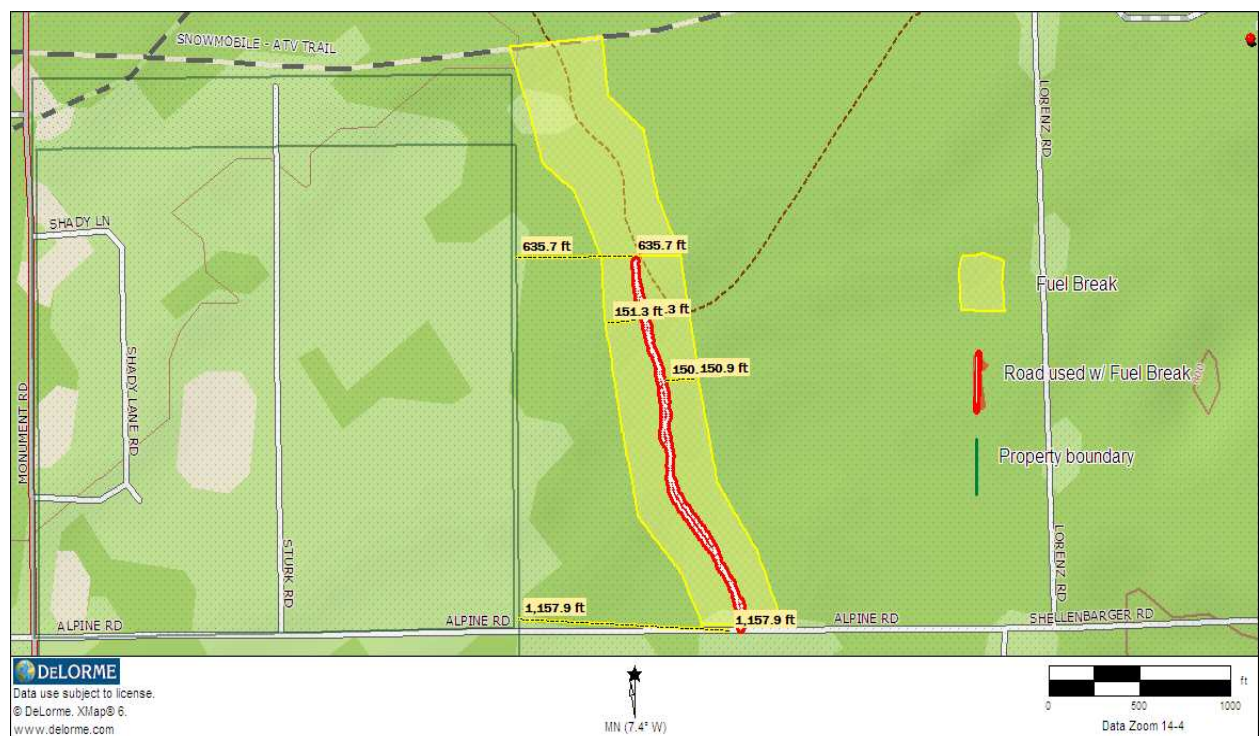
Fuels Specialist

Huron Shores Ranger Station

Purpose

This report models the effectiveness of a 300 foot fuel break based on the proximity to wildland urban interface (WUI). The Comparison of fuel break locations is based on environmental parameters typical for sustained crown fire in red pine (*pinus resinosa*). Modeling has taken place on the proposed fuel break along the property boundary north of Alpine Road and west of Monument Road in Iosco County MI. The alternative fuel break would incorporate an old forest road and a trail used for off road vehicle traffic illustrated in Figure 1.

Figure 1. Map of proposed fuel break.



Design

Things to consider when designing a fuel break for structure protection based on the direction from the Huron-Manistee National Forest Fire Plan and the Fuels Specialist Huron Zone Fire:

1: Size, shape and location: Fuel breaks are intended to reduce fire intensity by changing the fuel loading or fuel type in and around homes or other important values. This will assist any fire suppression efforts on fires coming from private land or going to private land.

Generally a fuel break should be wide enough to interrupt a wildfire under the worst conditions, and provide adequate room for suppression forces to safely work on the fire. This treatment area is

currently considered to be 300 to 500 feet but can be larger based on other factors such as surrounding fuels (type, continuity, arrangement), topography, and fire history to name a few.

2: Adjacent fuel types and fuel types that may be created through the proposed action: On the Huron-Manistee National Forest the most volatile fuel types are jack pine and red pine on sandy soils (Land Type Association 1 & 2). The fuel breaks should be developed to be savanna like in composition, with a crown spacing of 40 feet is desirable.

3: Slash disposal and follow up treatments: When using a timber sale to meet fuel break objectives, the treatment areas should be constructed in a manner to meet visual concerns and also reduce the fuel loading caused by logging activity. Sub merchantable trees damaged by the harvesting operation should be removed (by hand if necessary).

4: Fuel breaks need maintenance: National Environment Policy Act (NEPA) documents should speak to the need to maintain these fuel breaks. This includes prescribed fire and mechanical means. It should be expected that jack pine regeneration would occur in most of these fuel breaks. Mechanical treatment may not be feasible in many instances. Fuel breaks need to have a sound silvicultural prescription, and a monitoring program in place to help identify a maintenance schedule to ensure the fuel break stays effective. The average fuel return interval is 5-7 years post treatment.

5: Snags (standing dead trees) and dead and down are acceptable in fuel breaks: Large dead wood that is standing or arranged on the ground usually does not create a fuel hazard at the rates typically seen in a "healthy" forest. Snags around homes can pose a safety concern and may pose a greater risk to do damage to structures, but this area is limited to the 1-2 times the height of the snags from those structures, or roads. Exceptions to this are more or less continuous horizontal fuel loading as a result of blow down events or significant insect mortality that occurs within the fuel break. If these occur outside the fuel break the impact these fuels have on the fuel break effectiveness should be considered and necessary follow up treatments taken.

6: Land owners have a significant stake in increasing their homes risk of surviving a fire: Home owners should remove fuels within 30 feet of a structure to have the greatest impact on its ability to survive a fire. Encouraging land owners to reduce their risk of ignition must be a part of our fuel break strategy. We can help landowners by:

- 1) Encouraging the landowner to have a home risk assessment (HRA) to evaluate the owner's current ignition risk. The HRA must be done by a qualified individual. This will usually involve our Fire Prevention Specialists but might be done by the local fire department.
- 2) Follow up actions should be encouraged as appropriate to reduce their ignition risk.
- 3) Periodic HRA should be done every 5-7 years to track change.
- 4) When tree removal is involved, we should encourage private owners to coordinate their activities with those on Federal. We can do this by providing the names of willing owners to the timber sale purchaser or other contractors, and providing the contractor with extra time in their federal contract to allow time for some work on private.

Fuel Break design for this report:

The structure and design of the fuel breaks use in this report are designed as follows; the first 150-foot strip would be thinned to leave a crown spacing of 30 to 40 ft. The last 150-foot wide strip will be thinned to leave a crown spacing of 20 ft (figure 2 is an example of what the fuel break would look like). All jack pine (*pinus banksiana*), except those needed for den trees or snags would be removed. Retain all merchantable (5" Diameter at Breast Height or larger) hardwood species.

Figure 2. Example of the fuel break design when the crown spacing is 30-40 foot apart.



The parameters used for modeling in this report are; Temperature 75° F, Relative Humidity 25%, Wind Speed 10 mph, and 6 days since last significant rain.

The fuel loading for the forest in the area is an average of 15.779 tons/acre for litter, duff, and coarse woody material. The Fuel Model used for this simulation is a timber understory 5 based on the Scott & Burgan Fuel Models. The following charts are the fire behavior modeling based on all of the mentioned values. The results show the abilities of this fuel model to support a crown fire and the rate of spread (in Chains / Hour.)

Surface fire behavior modeling for fuel break efficacy.

Fri, Apr 16, 2010 at 16:35:46

Input Worksheet**Inputs: SURFACE**

Input Variables	Units	Input Value(s)
Fire Name		Simulation
Fire Date & Projection Period		April 16, 2010
Fire Analyst		Stearns

Fuel/Vegetation, Surface/Understory

Fuel Model	tu5
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Fuel Moisture

1-h Moisture	%	5
10-h Moisture	%	6
100-h Moisture	%	8
Live Herbaceous Moisture	%	30
Live Woody Moisture	%	50

Weather

20-ft Wind Speed (upslope)	mi/h	10
Wind Adjustment Factor		0.2

Terrain

Slope Steepness	%	4
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Results

Output Variable	Value	Units
Surface Rate of Spread (maximum)	5.3	ch/h
Flame Length	6.0	ft

End

BehavePlus 4.0.0 (Build 276)

Surface fire behavior modeling for fuel break efficacy.

Fri, Apr 16, 2010 at 16:49:10

Input Worksheet

Inputs: CROWN

Input Variables	Units	Input Value(s)
Fire Name		Simulation
Fire Date & Projection Period		April 16, 2010
Fire Analyst		Stearns

Fuel/Vegetation, Overstory

Canopy Base Height	ft	0.5, 5.5, 10.5, 15.5
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Fuel Moisture

1-h Moisture	%	5
10-h Moisture	%	6
100-h Moisture	%	8
Live Woody Moisture	%	50
Foliar Moisture	%	90

Weather

20-ft Wind Speed	mi/h	10
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Fire

Flame Length	ft	6
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Notes

This behave run shows the upper limits of wind under weather conditions that are typical for increased fire behavior.

Run Option Notes

None

Results

Canopy Base Ht	Critical Surf Int	Transition to Crown?	Crown Fire ROS
ft	Btu/ft/s		ch/h
0.5	3	Yes	33.5
5.5	92	Yes	33.5
10.5	242	Yes	33.5
15.5	435	No	33.5

End

Summary of fire behavior

Spotting for a crown fire in this fuel is 0.3 miles ahead of the fire and under the conditions used in this example the probability that a spot fire would occur is 61%. The surface fire behavior, under the set conditions, is capable of establishing crown fire. The crown fire behavior has the capability of spreading faster (33.5 chains / hour) than the standard firefighting equipment used on the Huron National Forest can produce an effective control line (15-35 chains / hour*).

Probability of impact

Wind speed and direction has been averaged for the 2 months that typically exhibit the greatest chance for a wildfire to occur (Figure 3&4). The location that this data was collected was from the Silver Creek weather station approximately 2 miles south of the fuel break. Figures 3 shows a 44% chance that winds would consist of the proper direction to impact the fuel break in the event of a start in that area. Figure 4 shows a 45% chance of the same occurrence.

*Taken from the NWCG Fire Line Handbook March 2004

Figure 3. Average wind speed, direction, and probability for April from 2006-2010.

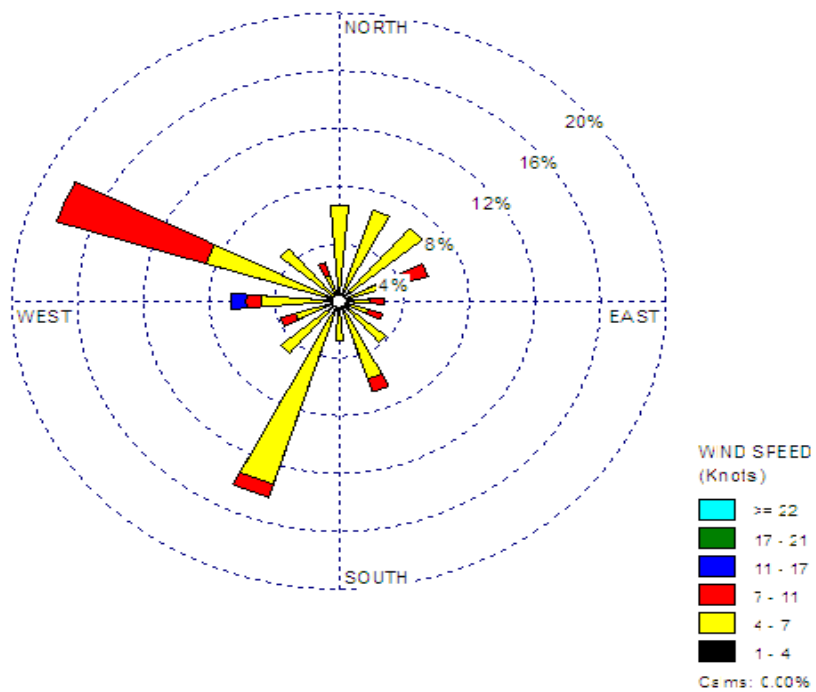
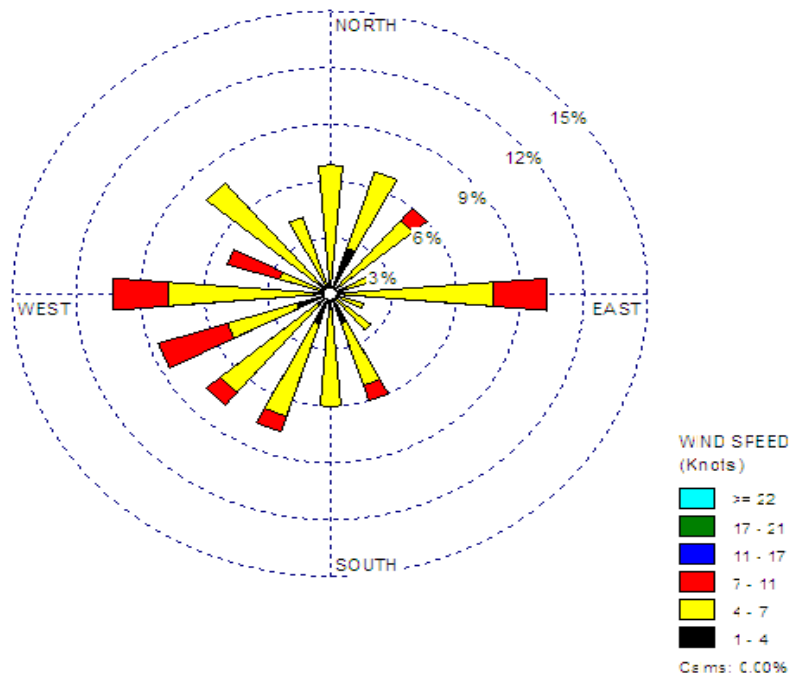
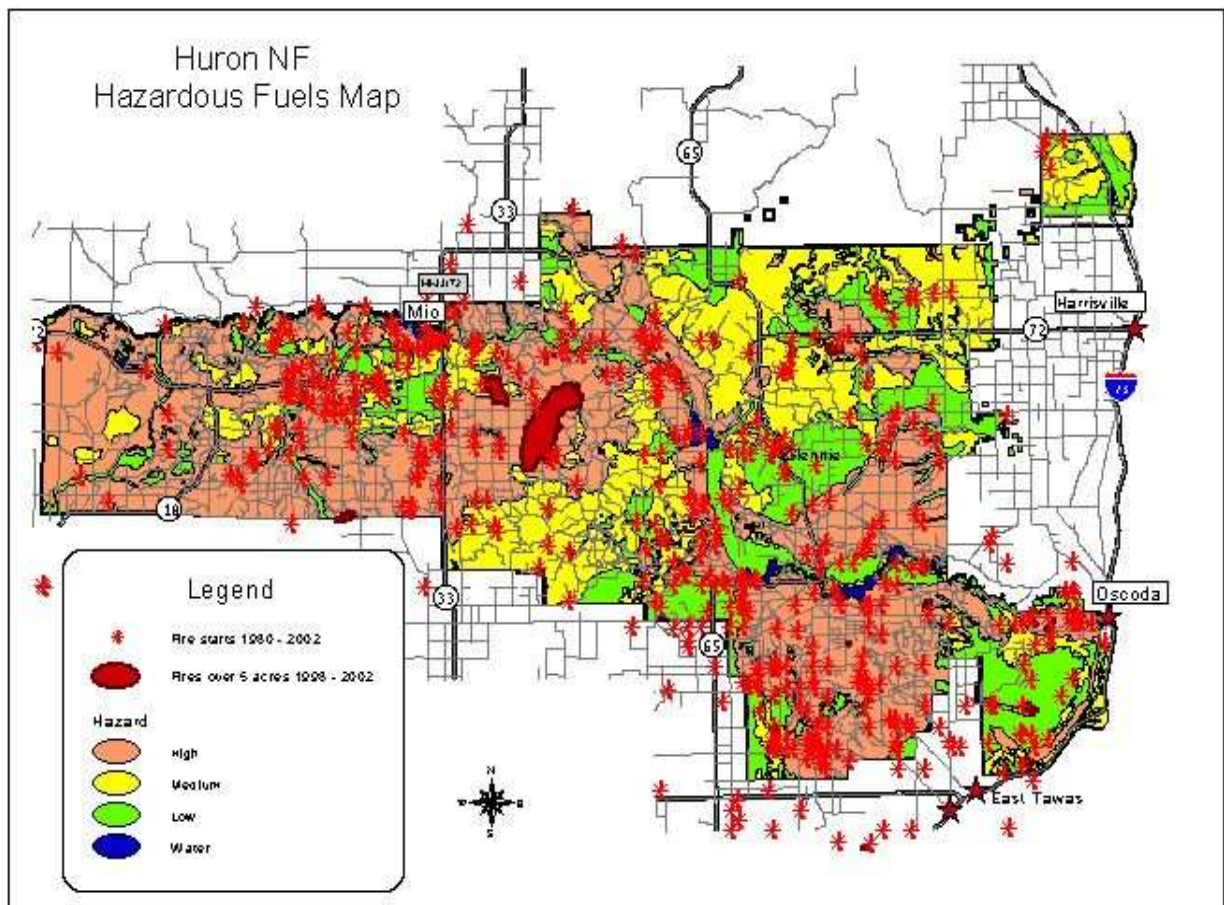


Figure 4. Average wind speed, direction, and probability for May from 2006-2009.



The fire potential and historical data (1980 -2002) for wild fires in the area are shown in figure 5. In addition to the fires shown on the map, 3 other fires have occurred since 2002 within 1 mile of the proposed fuel break. The location of the 3 fires were in areas east and southeast of the proposed fuel break that would be examples of the fires that could have impacted the community that the proposed fuel break is designed to protect.

Figure 5. Huron National Forest Hazardous Fuels Map and Historic fire locations from 1980-2002.



Comparison of Fuel Breaks

For this comparison the fuel breaks will be referred to as primary fuel break (the fuel break outlined in the Brittle 2 Fuels Reduction Project) and suggested fuel break (the fuel break suggested during the 30 day comment period). Both fuel breaks are constructed in a manner that has proven the ability to drop fire back down to the ground in the event of a crown fire. The primary fuel breaks can only enhance protection to structures if the property owner takes the responsibility to reduce the fuels on their private land and create defensible space around each structure. The suggested fuel break allows any fire that may become established between the fuel break and the private property to impact the private property with an increased fire behavior. The suggested fuel break may provide better protection to the National Forest if the wildfire starts on private and is carried to the National Forest lands. This is based

on additional time for firefighters to secure any threatened structures or values and then work on containing the wildfire. The priority for Huron National Forest Fire Zone is to protect lives then private property and then forest resources, so the fact that the suggested fuel break provides better protection for the forest is less of a priority than protecting private lands.

The primary fuel break would likely provide better protection to the structures on private property if the wildfire started on National Forest land and was moving in the direction of private property. The best explanation for this is the suggested fuel break leaves an area of 31.65 acres as a receptor bed for spot fires between the fuel break and the private land. This untreated area has the potential for a wildfire to reestablish as it is driven in the direction of structures on private land. This analysis has been discussed with the District Ranger, the Fuels Specialist for the Huron Fire Zone, and considered with previous fuel break examples. It is determined that the primary fuel break (originally developed for Brittle 2) would provide the community with a better level of protection in the event of a significant wildfire.